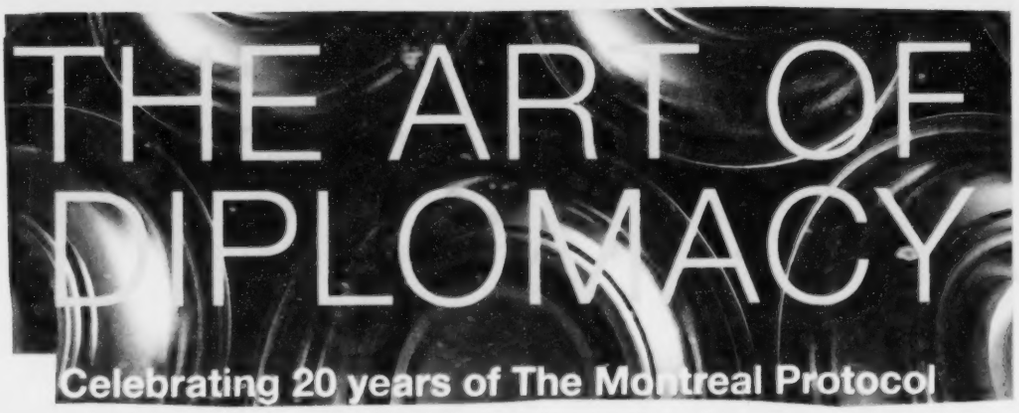
UNEP

OUR PLANET

The magazine of the United Nations Environment Programme - September 2007



THE ART OF DIPLOMACY

Celebrating 20 years of The Montreal Protocol

OUR PLANET

Our Planet, the magazine of the United Nations Environment Programme (UNEP)
PO Box 30552
Nairobi, Kenya
Tel: (254 20)7621 234
Fax: (254 20)7623 927
e-mail: uneppub@unep.org

To view current and past issues of this publication online, please visit www.unep.org/ourplanet

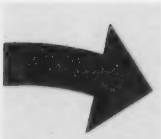
ISSN 101 - 7394

Director of Publication: Eric Falt
Editor: Geoffrey Lean
Coordinators: Naomi Poulton, David Simpson
Special Contributor: Nick Nuttall
Distribution Manager: Manyahleshal Kebede
Design: Amina Darani
Producedy by: UNEP Division of Communications and Public Information
Printed by: Naturaprint
Distributed by: SMI Books

The contents of this magazine do not necessarily reflect the views or policies of UNEP or the editors, nor are they an official record. The designations employed and the presentation do not imply the expressions of any opinion whatsoever on the part of UNEP concerning the legal status of any country, territory or city or its authority or concerning the delimitation of its frontiers or boundaries.

* All dollar ($) amounts refer to US dollars.

The ozone layer at a glance...



...charting the history of the ozone layer from its formation 400 million years ago through to the present day, including the protocols adopted to protect it.

a walk through history - page 4

Mostafa Tolba, President of the International Centre for Environment and Development and UNEP's Executive Director at the time of the negotiation of the Montreal Protocol...

...describes the process that leads to the world's most successful environmental treaty and calls for further action.

lessons learned - page 6

Drusilla Hufford, Liu Yi and Romina Picolotti demonstrate the success of strong leadership in their respective countries.

strong leadership - page 10

Mohamed T. El-Ashry, Senior Fellow, UN Foundation and CEO and Chairman of the GEF 1991-2003...

...describes the unprecedented compact that is saving the ozone layer and calls for a similar one to combat climate change.

a new compact? - page 14

Prof **Mario Molina,** Nobel Prizewinner for Chemistry ...

...describes how climate change is delaying the recovery of the ozone layer, and calls for action.

recovery delayed - page 16

Kalpana Sharma, a columnist for The Hindu where she was until recently Deputy Editor...

...describes difficulties in phasing out ozone depleting substances in India.

meeting the target - page 18

Danielle Fest Grabiel, a senior campaigner at the Environmental Investigation Agency...

...argues that the Montreal Protocol must be revitalised to meet new and urgent challenges.

crucial crossroads - page 20

Jamie Choi, F-gases project leader at Greenpeace, China...

...describes the rapid spread of green refrigeration, but says that more remains to be done.

greenfreeze - page 22

Neneh Cherry, singer and songwriter...

...believes the world is "beginning to wake up" to environmental challenges.

cherry trees - page 27

also

page 3 reflections
page 8 verbatim and numbers
page 9 books
page 13 people
page 24 awards and events
page 25 www
page 26 products

reflections

by Achim Steiner, UN Under-Secretary-General and Executive Director of UNEP & Marco Gonzalez, Executive Secretary of the Ozone Secretariat

It was 1987. The Soviet Union launched the Mir Space Station, the world population reached five billion, Oscar Arias Sanchez won the Nobel Peace Prize and Paul Simon's 'Graceland' was named record of the year. But perhaps the key event occurred in Canada, when the world's nations agreed to the Montreal Protocol to repair and protect the Earth's protective ozone layer.

The treaty is perhaps the single most successful international environmental agreement ever made. It generates science and deploys funds to assist developing countries to phase out ozone damaging chemicals, like chlorofluorocarbons (CFCs) and halons. But its impact stretches beyond safeguarding public health from excessive ultra violet rays from the sun.

It is now clear that - as ozone depleting substances are also often powerful greenhouse gases - the treaty has also spared the planet and its people much global warming. Above all, it is a symbol of how, when faced with a serious international threat, nations can set aside differences and make common cause under the United Nations.

This edition of Our Planet celebrates the Protocol's 20th anniversary and the past, present - and also perhaps future - achievements of those who have made it a success. Future because - though 95 per cent of the substances it controls have been phased out - the remaining five per cent may prove troublesome. Getting rid of them is necessary for the ozone layer's full recovery.

Besides, some ozone depleting chemicals are also being increasingly employed in ways that fall outside the treaty's provision. An example is methyl bromide being used not as a controlled pesticide but as a currently uncontrolled fumigant on wooden pallets in international shipments.

UNEP's involvement in the issue began in 1977 following rising disquiet over links between CFCs and damage to the Earth's protective ozone layer. The big catalyst for action came when the British Antarctic Survey found an ozone hole over Antarctica in 1985. Remarkably, governments acted swiftly to agree on the treaty once the science was accepted. Just as important, industry - once provided with incontrovertible evidence - also moved fast to provide and use alternatives.

The Multilateral Fund - which has provided over $1.3 billion in funding for developing country phase outs – is another key to success. This summer China shut down five plants, putting it two and a half years ahead of the developing countries' 2010 deadline for phasing out CFCs and halons.

A big challenge, as governments celebrate in Montreal in September, is how the treaty can contribute even more to combating climate change. Scientists from the Netherlands and the United States estimate that, by 2010, phasing out CFCs and other ozone depleting substances will save the equivalent of eleven gigatonnes of carbon dioxide a year. This compares to a cut of just one gigatonne over 1990 levels mandated under the Kyoto Protocol, or two gigatonnes from what the 2010 levels would be if emissions has been allowed to grow unchecked.

It could, they add, contribute even more, since some of the alternative chemicals to CFCs, such as HCFCs and HFCs, also have climate change impacts. They suggest that a combination of accelerated phase-out, the introduction of more climate-friendly products and relatively small changes in industrial practices could cut the equivalent of something over another gigatonne of carbon dioxide.

So the story of the Montreal Protocol has not yet reached its final chapter. There is much more to do and wider benefits to be harvested. But it has already achieved much to celebrate, putting the ozone layer on the road to recovery. Experts calculate that - without the decisions taken 20 years ago – atmospheric levels of ozone depleting substances would have increased tenfold by 2050, leading to up to 20 million more cases of skin cancer and 130 million more cases of eye cataracts, not to speak of damage to human immune systems, wildlife and agriculture. Its continued success must be assured.

UNEP promotes environmentally sound practices globally and in its own activities. This magazine is printed on 100% recycled paper, using vegetable -based inks and other eco-friendly practices. Our distribution policy aims to reduce UNEP's carbon footprint.

Cover photo © Franck Boston/istockphoto. The 20-year operation to preserve the ozone layer, the planet's protection from harmful ultraviolet radiation, is the theme for this issue of Our Planet. Aerosol sprays epitomize in many people's minds the campaign launched under the Montreal Protocol to phase out ozone-depleting gases. With the Montreal Protocol's success comes the realization that global environmental problems can be solved by global commitment. As our authors point out, this includes climate change, the pre-eminent challenge of our time.

a walk through

Science

Science suggests the ozone layer was formed some 400 million years ago.

1928

Scientists synthesize CFCs.

1973

Scientists detect CFCs in atmosphere.

1974

Nobel prize winners Molina and Rowland discover that CFCs can break down stratospheric ozone.

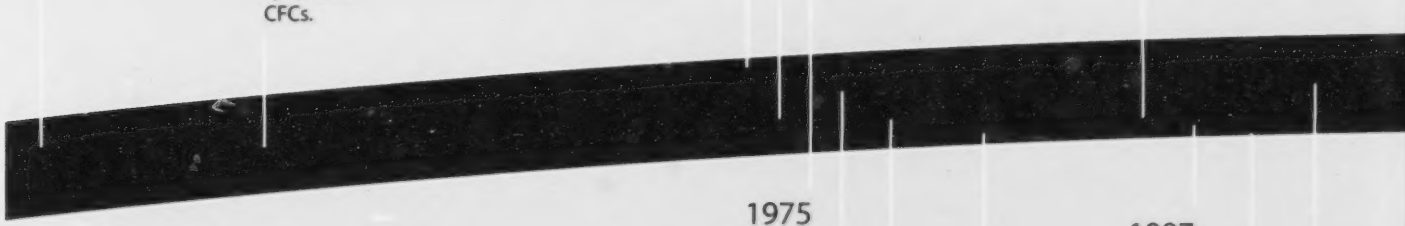
1975

Scientists discover that bromine, used in fire-retarding halons and agricultural fumigants, is a potent ozone-depleting substance.

1985

British Antarctic Survey team discovers Antarctic ozone hole (7.3 million square miles), marking the first evidence of stratospheric ozone depletion.

Scientific research reveals stratospheric ozone layer depletion has adverse environmental and human health effects.



Action

1975

SC Johnson announces corporate phaseout of CFCs as aerosol product propellants.

1976

United Nations Environment Programme (UNEP) calls for an international conference to discuss an international response to the ozone issue.

1978

U.S. bans non-essential uses of CFCs as a propellant in some aerosols (e.g., hair sprays, deodorants, antiperspirants). Canada, Norway, and Sweden follow with a similar ban.

1981

UNEP acts on a proposal to develop a global convention to protect the ozone layer.

1987

Twenty-four countries sign the Montreal Protocol on Substances That Deplete the Ozone Layer. Mexico the first to sign

1989

All developed countries that are parties to the Montreal Protocol freeze production and consumption of CFCs at 1986 levels.

1990

London Amendment to the Montreal Protocol adds controls on carbon tetrachloride and methyl chloroform and creates the Multilateral Fund

history

1991

International scientists agree that CFCs are depleting the stratospheric ozone layer in the northern and southern hemispheres.

1992

Copenhagen amendment adds HBFCs, methyl bromide and HCFC controls to the Montreal Protocol

1993

DuPont™ announces that it will halt its production of CFCs by the end of 1994.

1994

Developed country parties eliminate production and import of halons.

1996

Developed country parties eliminate production and import of CFCs, carbon tetrachloride, methyl chloroform, and hydrobromofluorocarbons.

2000

Japan Meteorological Agency reports the hole in the stratospheric ozone layer over the Antarctic is at its largest ever—more than twice the size of Antarctica.

2002

All developing countries that are parties to the Montreal Protocol freeze methyl bromide production at 1995–1998 average level.

2004

Developed country parties to the Montreal Protocol reduce use of HCFCs by 35 percent.

2007

China, the biggest producer of the CFCs and Halons, closes down its producing facilities.

2010

All developing countries that are parties to the Montreal Protocol scheduled to phase-out CFCs, halons and carbon tetrachloride.

2015/2016

All developing countries that are parties to the Montreal Protocol scheduled to phase-out methyl bromide and methyl chloroform in 2015/ freeze HCFC production and import at 2015 levels in 2016.

2030/2040

All developed countries that are parties to the Montreal Protocol scheduled to phase-out HCFCs/ developing country parties scheduled for HCFC phaseout in 2040.

2050-2075

Earliest timeframe projected for the ozone layer to recover.[2]

Executive Summary, WMO/UNEP Scientific Assessment of Ozone Depletion: 2006, Scientific Assessment Panel of the Montreal Protocol on Substances that Deplete the Ozone Layer, August 18, 2006. p. 7.

Adapted from a report by the US Environmental Protection Agency with their kind permission

Unlike other global environmental problems—such as the transboundary movement of hazardous wastes, the loss of biodiversity, climate change, and persistent organic pollutants—the impacts of ozone depletion cannot be readily seen or felt. Even so, the world's nations chose to apply the precautionary principle because the most reliable scientific evidence pointed to the fact (even though we could not be certain) that the Earth's protective ozone layer had been, was being, and, above all, was continuing to be depleted. They chose to negotiate a binding treaty—the Montreal Protocol—to phase out the production and use of ozone depleting substances.

The sense of urgency shared by the Protocol's negotiators caused the establishment of a number of other precedents, quite apart from this vivid application of the precautionary principle. They include:

- The application of the principle of common but differentiated responsibility, where developing countries were given a ten year grace period before they had to apply the Protocol's provisions.

- The provision of technical and financial support to poor countries through a special Multilateral Fund essentially paid by developed countries, but with developing ones having an equal number of votes in the Executive Committee that decides on its disbursement. The developed nations were also committed to transferring the necessary technologies to developing ones so that they could meet their obligations under the Protocol.

- And, most important: flexibility. Governments originally resolved, under the Protocol, to phase out 50 per cent of all ozone-depleting substances by the year 2000. Three years later, in 1990, they agreed a 100 per cent phase out by the same date. After another two years, and the accumulation of more scientific evidence, they advanced this to 1995.

These changes were not considered to be amendments of the Protocol that would have required lengthy ratification procedures. Instead the negotiators invented the term "adjustment", which meant that when any of these changes was adopted by a two thirds majority of the Parties it became binding on all without any need for ratification. When the Multilateral Fund was established by an amendment to the Protocol, the Parties decided by a simple decision to establish an Interim Fund of US$240 Million until it entered into force. Many considered this to be unprecedented in international law.

ssons arned

afa K. Tolba

Several key ingredients made a difference time and again during the negotiations:

- The presence of a core group of countries intent on moving to a Protocol phasing out all ozone depleting substance.

- The role of science and technology. Science—and the consensus among scientists worldwide—was a critical ingredient in the Protocol process. So was technology, and the consensus that emerged on what could be accomplished and by when. Even more important was the Protocol's assessment and reassessment process, since it forced review and was almost impossible for the Parties to discount.

- Willingness to compromise. The negotiation of the Protocol involved many countries with strong views on what should be done—but there was always a willingness to take one step at time. The spirit of compromise was critical to its success.

- Some strong personalities. In the end, everything boils down to individuals and personalities. The Montreal Protocol process had more than its share of strong and effective ones. UNEP's leadership had to pull all the parts together, know whom to ask to do what, cajole, coax, push and pull. And the G-77 had a leadership that was savvy about when and where take a stand - and about when and where to compromise.

- Mobilizing public opinion is the sine qua non of environmental negotiation. The framework Vienna Convention was agreed in a climate of only mild interest: neither the NGOs nor the media had drawn enough attention to the ozone problem to arouse the public. But when reputable scientists reported that the ozone layer was being depleted above the Antarctic and that the likely results would be increased risks of cancer, cataracts, and crop failures and reduced immunity, the media responded with headlines and an aroused public pressed for quick action. Citizen groups and NGOs demanded and got the swift negotiation, adoption and entry into force of a viable control mechanism. From scientists' first signalling the role of chlorofluorocarbons (CFCs) in ozone depletion in 1974 to the Vienna Convention's entry into force in 1989 took fifteen years. By contrast it took only two to negotiate, adopt, sign, ratify, and enforce the Montreal Protocol. Scientific certainty, mobilizing public concern, made the difference.

Probably the most important lesson of the negotiations was the value of the informal consultation, away from the microphones. The negotiators' goals remained the same as in the formal sessions. But because they were not committing their governments in these informal off-the-record conversations they could be more relaxed - and more open to seeing the others' interest in reaching common solutions and to making compromises. They become friends working for a common cause.

None of these factors, however, would have been enough to bring about the Protocol had it not been for a basic change in national attitudes away from the primacy of national sovereignty and toward international cooperation. During the negotiations, the issue of sovereignty was never raised, though, in a sense, each country was interfering in the internal affairs of all the others in safeguarding everyone's environment.

What is really important is that the legal obligations established under the Ozone Convention and the Protocol are preventive rather than remedial. The two instruments, and particularly the Protocol, were designed to be flexible and to be adapted to changing conditions. The periodic assessments mandated by them will assure their relevance and usefulness well into the future. Of concern, however, is the fact that Governments have been unwilling to strengthen the non-compliance procedures and to carry them out vigorously; this needs serious consideration.

As the Protocol celebrates its twentieth anniversary, its Parties can also use it to help combat global warming. The hydrochlorofluorocarbons (HCFCs) and the hydrofluorocarbons (HFCs), which have been used as substitutes for ozone-depleting substances, have long been known to have high global warming potential. They have been in use for almost twenty years and now need to be phased out.

The Parties of the Montreal Protocol can apply its flexible adjustment gradually to achieve this. The protocols existing phase-out measures, it is estimated, will reduce the global warming potential of greenhouse gases five to six times as much as the cuts agreed in the Kyoto Protocol, and accelerating the phase out of HFCs and HCFCs will cut it even more. This deserves serious consideration. I believe it can be done if the world community is really concerned about the very serious impacts of climate change.

verbatim

"Perhaps the single most successful international agreement to date has been the Montreal Protocol."

Kofi Annan, former Secretary-General of the United Nations in his Millennium Report

"It is our hope that the Vienna Convention and the Montreal Protocol will be of concern not only to Northern-hemisphere nations but also to those of the South, and that the latter will embrace these measures and act as full participants in the search for solutions to the economic, social and ecological consequences of ozone layer depletion."

Abdoulaye Wade, President of Senegal

"And by really carefully monitoring how badly the ozone is being damaged, that can alert countries and governments to act much quicker than they, perhaps, have acted up to now..."

Richard Branson, Virgin Group

"We estimate that ozone effects on plants could double the importance of ozone increases in the lower atmosphere as a driver of climate change, so policies to limit increases in near-surface ozone must be seen as an even higher priority."

Professor Peter Cox of the University of Exeter, UK

"I am pleased to note that the Montreal Protocol is widely recognized as one of the most successful multilateral environmental agreements to date, not in terms of its promise, but in its results."

Mr M. Enkhbold, Prime Minister of Mongolia

"If ozone protection is regularly taught in our learning institutions as part of science and health subjects, the pupils and students will become permanent messengers informing their parents and the community about the ozone protection issue."

Francis Nhema, Minister of Environment and Tourism, Zimbabwe

"The closure of these plants demonstrates China's continued commitment to meet its obligations under this treaty to phase out these chemicals. With the closing of these facilities, ... there will soon be significant reductions in ozone depleting chemicals and that we should be prepared for the changes that are to come."

Zhang Lijun, Vice Minister, State Environment Protection Administration. China closes ozone depleting chemical plants in July 2007

"It's important to remember that skin cancer is a very significant problem in Australia. Every year around 1,500 Australians die from skin cancer, and one in two Australian will develop skin cancer in their lifetime."

Dr Stephen Shumack , Secretary of the Australasian College of Dermatologists, Australia

numbers

1913

The year the existence of the ozone layer was discovered by French physicists Charles Fabry and Henri Buisson

20,000

Ozone exposure is thought to cause the premature deaths of up to 20 000 people within the European Union each year (www.eea.europa.eu)

10

The percentage increase in UVB radiation associated with a 19% increase in melanomas for men and 16% for women. (http://en.wikipedia.org/wiki/Ozone_depletion)

2010

Montreal Protocol deadline for the phase-out of chlorofluorocarbons (CFC) and halons. Without the Montreal Protocol, levels of ozone depleting substances in the atmosphere would have increased tenfold by 2050, which could have led to up to 20 million more cases of skin cancer and 130 million more cases of eye cataracts relative to 1980. (http://www.unep.org/Documents.Multilingual)

1,500,000

The number of avoided cases of melanoma skin cancer in the world by 2060 due to the implementation of the Montreal Protocol. (OzonAction, UNEP)

95

The percentage phase out in 2005 of the production and consumption of ozone depleting substances as compared to 1987. This is despite a 33 % rise in global CO2 emissions since 1987. (OzonAction, UNEP)

4%

Average percentage rate at which ozone concentrations are dropping per year in the northern hemisphere (Wikipedia)

474,360

Total in tonnes of CFCs in refrigeration equipment globally as of end 2005. (OzonAction, UNEP)

90

Percentage of ozone in the earth's atmosphere that is contained in the stratosphere, around 15 and 40 km above the surface of the earth

700

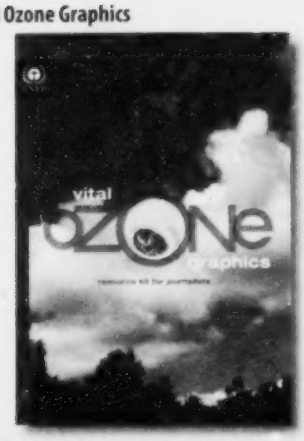
Data from more than 700 air quality measurement stations across Europe are transmitted to the European Environmental Agency in Copenhagen on an hourly basis. (www.eea.europa.eu)

3

Number of oxygen atoms that combine to form ozone, O3

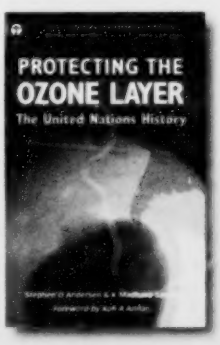
books

Vital Ozone Graphics



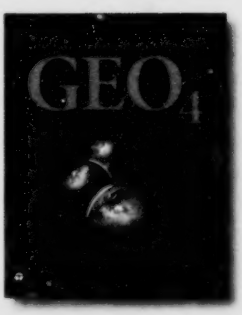
Through high-quality graphics and concise facts and figures, this publication helps the reader understand the ozone layer depletion issue, the international response under the Montreal Protocol on Substances that Deplete the Ozone Layer, successes achieved to date and upcoming challenges.

Protecting the Ozone Layer



Authors: Stephen O. Andersen and K. Madhava Sarma (Published by Earthscan in 2002 for UNEP)
This publication tells the remarkable story of the Montreal Protocol, now recognized as a unique example of international cooperation on environmental issues.

GEO-4

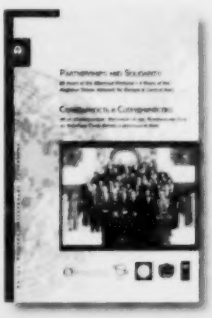


The fourth report in the Global Environment Outlook (GEO) series provides a comprehensive, scientifically credible, policy-relevant and up-to-date assessment of, and outlook for, the state of the global environment. GEO-4 is published 20 years after the landmark World Commission on Sustainable Development report - Our Common Future. Environment for Development is the underlying theme of GEO-4 and the report pays special attention to the role and impact of the environment on human well-being as well as to the use of environmental valuation as a tool for decision-making.

Buildings and Climate Change – Status, Challenges and Opportunities

As one of the products of the Sustainable Buildings and Construction Initiative (SBCI), this publication outlines the salient features of energy use and greenhouse gas emissions from building use and construction. It assesses the factors affecting the ability and willingness of the building and construction sector stakeholders to adopt energy efficiency and consequently greenhouse gas emission reduction measures. The SBCI brings together stakeholders from all phases of a buildings' life span, such as material manufacturers, architects, real estate developers, construction companies, maintenance and services companies as well as local authorities.

Partnerships and Solidarity



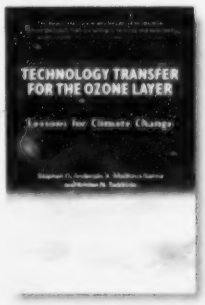
The publication describes the activities and successes achieved by the regional ozone network for Europe and Central Asia. It focuses on the power of networking as an effective and creative tool to implement the Montreal Protocol.

Sudan Post-Conflict Environment Assessment

The Sudan Post Conflict Environmental Assessment provides an overview of the environmental status and issues for Sudan and its territorial waters of the Red Sea. It focuses on linkages between the environment, conflict and the ongoing humanitarian and development programmes. Topics addressed include environmental institutions and legislation, the marine and freshwater environments, agricultural land use and degradation, forestry, wildlife conservation and protected areas and the impact and environmental resource needs of displaced populations. The report is based upon a combination of desk study work, remote sensing and field reconnaissance missions.

www.unep.org/publications

Technology Transfer for the Ozone Layer: Lessons for Climate Change



Stephen O. Andersen, K. Madhava Sarma and Kristen N. Taddonio (Earthscan, 2007)
A new book presenting lessons and insider accounts demonstrating how and why technology transfer works for stratospheric ozone protection. Ultimately the book provides the only thorough assessment of successful technology transfer of the nature and scale required for combating climate change and other global environmental challenges. Study the details of transfer of ozone-safe technologies over 15 years, hear directly from three dozen sector experts, recall your own contributions to the remarkable victory in making the world safer for future generations and how the success for ozone layer may be translated to climate change.

Surviving the Century – Facing Climate Chaos and Other Global Challenges

Edited by Herbert Girardet (Earthscan 2007)
Environmental and human catastrophe looms ever larger for planet Earth. From the need to build sustainable cities to house growing billions, to transforming the international trade system to tackling run-away climate change, action is needed now to turn a deepening global crisis into an opportunity for change. This book, the first major output by leading lights from the World Future Council (WFC), a new international lobby for future generations, seeks the transformation of how humans relate to the world and one another.

Where the land is greener

Editors: Hanspeter Liniger and William Critchley
Co-published by: CTA, FAO, UNEP and CDE on behalf of WOCAT
Is there only bad news about environmental degradation and soil erosion? No! there are signs of success all over the world - where people are improving their land. The evidence is compelling, and offers hope - not just for poverty alleviation and livelihoods but also in the battle against climate change. Each hectare of land that is protected against erosion captures carbon in the soil, and prevents the release of greenhouse gasses. Land is also protected against desertification – and holds water better to supply streams. Where the land is greener", compiled by the World Overview of Conservation Approaches and Technologies (WOCAT), documents some 42 cases from more than 20 countries, and analyses what is driving these positive trends. The publication is well illustrated with simple but descriptive charts and images

United States of America

by Drusilla Hufford

U.S. implementation of ozone protection began in 1987, when President Ronald Reagan personally supported it against the advice of key high-level officials. It has continued to be characterized by strong leadership: from the U.S. Congress in framing the visionary approach that guided the nation's response to ozone depletion; from key industry leaders who invested and shared information and took commercial risks; from strong voices in the environmental community; and from entrepreneurial government policy-makers.

The early years demanded a framework for success. The U.S. Congress supplied this by amending the Clean Air Act (CAA) to enable the Environmental Protection Agency (EPA) to carry out our Protocol commitments for phasing out ozone-depleting substances (ODS). It also specified domestic mechanisms that increased the transition's smoothness, speed and clarity, including a ban on nonessential products and a system for reviewing and approving safe alternatives.

As a result, the US has met requirements more rapidly, and at lower cost, than anticipated. By 1996, our phaseouts were occurring four years faster and covering 13 more chemicals than planned, while estimated costs dropped from $3.55 to $2.45 per kilogram. Such studies as the 2003 Thompson Report, developed by the U.S. Office of Management and Budget, show we are getting more health benefits through protecting ozone than from almost any other CAA program. Ending damage to the ozone layer is expected to prevent 6.3 million future U.S. deaths from skin cancer: benefits exceed costs twenty fold.

The U.S. has virtually completed phaseout of the most damaging ODS. Limited exemptions are tightly monitored and decline yearly: the use of CFCs in asthma inhalers, for example, has decreased by over 90% in the last decade. Among our biggest challenges has been phasing out the fumigant, methyl bromide (MeBr), due to unique conditions facing U.S. Agriculture - but we have made substantial progress here too: the U.S. now allocates less than one-fifth as much MeBr for critical uses as was used in 1991. We expect consumption to continue to decline as growers adopt alternatives, lower the proportion of MeBr in pesticide formulations, and reduce amounts needed for pest control.

The U.S. has also led in meeting the Protocol's requirements for phasing out hydrochlorofluorocarbons (HCFCs), the less-damaging transitional substitutes. In a "worst-first" approach, the U.S. phased out HCFC-141b, exceeding the 35% reduction required under the Protocol, a full year ahead of schedule. EPA sent consistent regulatory signals on the phaseout schedule as early as 1993, giving manufacturers ample time to make smart investments in alternative substances and technologies.

U.S. success stems from our market-based allocation system, allowing EPA to track compliance and control imports and exports while providing a mechanism for trading among companies. Its electronic data base tracks the thousands of annual transactions by the dozens of companies that trade in ODS under our allowance and exemption programs – ensuring not only that companies comply with CAA requirements but also that the U.S. reports accurate, timely data to the Protocol Parties.

Compliance assistance can help the adoption of the needed changes. EPA's guidance documents, training programs, and technical support - including videos for technicians topics like repair leaks of ODS and safely disposing of them – are sought not only within the U.S. but by other countries. When this fails, the Government pursues violators aggressively. Between January 1998 and July 2003, the U.S. Department of Justice brought 82 cases, convicted or obtained guilty pleas from 119 defendants, imposed over 76 years of imprisonment, assessed $40,233,395 in fines, obtained $30,156,260 in restitution, and seized about 1.25 million pounds of CFCs.

The companion mechanisms that Congress created have also been highly effective. Early bans on uses - such as aerosols, pressurized dispensers, and flexible foams - served to limit emissions and produce faster transitions for both CFCs and HCFCs. Assuring the availability of viable alternatives is also vital: the EPA's Significant New Alternatives Policy (SNAP) program has so far identified and reviewed over 300 alternatives in major industrial, consumer, and defense applications.

In all these areas, decisive leadership has been vital to U.S. contributions to the Protocol's global success. Continuing success in completing its important agenda of future work will rely just as heavily on partnerships, vision, and the willingness to make -and rigorously implement - difficult decisions.

leadership

China
by Liu Yi

China completely phased out CFCs and halons by the end of June under its National Accelerated Phaseout Plan (APP) - in what is a big gift, solemnly presented by its government and people on the 20th Anniversary of the Montreal Protocol. This important milestone, a key step towards the Protocol's ultimate target, marks another big success for the treaty.

As the largest producer and consumer of CFCs and Halons among developing countries, China has remained serious and active in implementing the Protocol for the past two decades. It has achieved great progress, receiving common respect and praise from the international community. With such international support, China took the lead in adopting the phaseout mechanism in all of its twelve industrial sectors. It put its APP into effect to speed up its nationwide implementation of the framework Vienna Convention, with the additional aim of helping the whole world to implement the Protocol. People and enterprises in China endured great pressure and economic losses in hitting this target, but the government and the people believe firmly that this is necessary and worthwhile for the benefit of humankind. Thus, the country has never hesitated in speeding up its implementation measures.

The Protocol is one of the few recognised successes for common goals through the cooperation of all nations in the history of the human development and of the United Nations. It implementation over the last two decades may be only flash in the long unfolding of human development - but it serves as a shining spark too. It also provides a rich classroom, through which so many lessons can be learned.

Its success relies on advanced science, giving all the world's people a common understanding on the protection of the ozone layer and demonstrating that we have no time for delay if we are to protect the earth on which we live. The world has maintained the principle of "common but differentiated responsibilities" under which the parties to the Protocol implement their commitments and responsibilities. The United Nations has established and successfully operated the Protocol's Conferences of Parties, the Convention's Secretariat and the Multi-lateral Fund ExCom/Secretariat. The international implementing agencies - including UNEP, World Bank, UNDP and UNIDO, and the National Ozone Units of the Article 5 (developing) countries - have formed an efficient organism for implementing the Protocol. This is a big ozone family filled with consolidation, cooperation and harmonization.

Helped by strict rules, flexible policies, the continuing reform of the operational mechanism and powerful financial and technical support, the parties involved in implementing the Protocol have been well led and organized fully to cooperate and contribute. This has created a shining example of the UN's outstanding work , and proved a great inspiration for implementing other environmental, political, military and economic conventions.

Argentina

by Romina Picolotti

Few countries in the world are as grateful as Argentina for the extraordinary progress of the Montreal Protocol in its ability to protect the Ozone layer, and to allow for its regeneration. The decomposition of the ozone directly over the southern cone of South America - as a result of the massive amounts of noxious chemicals released by human activities into the atmosphere, - has directly affected my country's health, environment, and economy. We will continue to feel these impacts for some years, but I sleep better knowing that my children, the children of Argentina, and future generations will not suffer from this menace. The ozone is slowly but surely re-weaving its natural fabric, and will protect us once again from the damaging rays of the sun.

Because of the direct impacts it has suffered, Argentina has made its implementation of the Montreal Protocol an environmental priority. In 1990 it demonstrated its international commitment by ratifying the Vienna Convention and the Montreal Protocol on Substances that Deplete the Ozone Layer. Since then, we have prohibited establishing new CFC producing plants, producing CFC aerosol spray propellants (with electronic and medical use exceptions), and importing halogens.

The Government's implementation of the Protocol has allowed Argentina not only to meet the target of reducing CFC consumption by 50 per cent in 2005, but also to achieve the much greater emissions reduction of 65 per cent. This is mainly a result of converting industrial technologies that used CFCs to alternative substances, less harmful to ozone. We have delivered equipment and the necessary tools for good refrigeration practices to small workplaces that would never have been able to adopt the new measures and technologies without assistance. We have also reduced the tobacco sector's consumption of methyl bromide by nearly 80 per cent - an important goal for Argentina - as our professionals were able to develop new technologies that allowed us to cut the cost of alternatives.

Argentina's success is based on hard work and dedication, but it could not have been achieved without the support we received from the Protocol's financing and technical support mechanisms. We are now pleased to have been nominated for an award of excellence for our national licensing system.

Conscious that ozone-depleting substances also contribute to global warming, Argentina and Brazil jointly proposed an adjustment to the Protocol last March to accelerate the phase-out of HCFCs. This would both maximize the treaty's benefits for climate change, while protecting ozone even further. Substitutes for HCFCs are available, but it is critical to ensure that only the most climate-friendly ones are used if the benefits of an accelerated phase-out are to be captured. This will require donor countries to provide appropriate levels of financial assistance through the Multilateral Fund to cover the incremental costs of transition to such substitutes. It will also be essential to send clear regulatory signals to industry to encourage and reward technological innovation.

Argentina recognizes that incorporating climate priorities into the Protocol will breathe new life into its extraordinary ability to drive innovation, and thus spur the development of new ozone- and climate-friendly chemicals and technologies. The potential benefits of the Protocol for the climate represent one of the best and most cost effective strategies for achieving significant and rapid reductions in greenhouse gas emissions, thus providing valuable insurance against the threat of abrupt climate change.

Argentina believes that the global community must leverage the Montreal Protocol's experience and resources - including its sophisticated and robust network of ozone officers in every country and its effective financial framework for implementation. Its experiences and success are valuable lessons for all environmental treaties, and could be particularly helpful in global efforts to confront the challenge of climate change. The Protocol gives us precise regulatory tools to help control the climate problem. The new regime that is needed for when the current phase of the Kyoto Protocol ends in 2012, could blend Montreal's regulatory approach with the market-based cap and trade system. We need both, and ultimately we need to make them work together.

people

KATHARINA KUMMER-PEIRY (Switzerland) has been appointed as the Executive Secretary of the Basel Convention

on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Ms. Kummer-Peiry brings to the Convention substantive knowledge of the Convention and strong negotiation and leadership skills. Her career spans several years with the Government of Switzerland as Head of Environmental Affairs Section in the Federal Department of Foreign Affairs, and as a University lecturer and more recently as a consultant on environmental policy and law. Ms. Kummer-Peiry has authored and contributed to a number of publications on international chemicals and waste management, and is a recognized international expert on chemicals management. She holds a PhD in International Law and a Master of Law. Ms. Kummer-Peiry will assume her duties in September 2007.

British Member of Parliament BARRY GARDINER has been appointed the

Prime Minister's special representative on forestry. He will be working alongside Nobel Peace Prize laureate Wangari Maathai and the former Prime Minister of Canada Paul Martin. Part of the UK's strategy on mitigating climate change involves investing substantial funds in protecting and rehabilitating tropical rainforests, such as that in the Congo Basin. Mr Gardiner said "Climate change is the political issue of our generation and the destruction of forests contribute to 20 per cent of the world's greenhouse gases each year. It is a privilege to be able to do something that will make a real difference to the lives of our children and future generations."

MARYAM NIAMIR-FULLER has been appointed Director, Division of Global Environment Facility Coordination of UNEP. Ms Niamir-Fuller holds a Master's Degree in Regional Planning and a PhD in Rangeland Management and Soil Conservation. She brings to UNEP 27 years of experience in the technical

areas of sustainable rural development and environmental management in Africa, West Asia, Asia and Latin America, including work with USAID, several UN Agencies and international NGOs. She also has seven years of experience with the GEF, and since 2003, as Principal Technical Advisor for UNDP's GEF Unit in the Focal Area of Land Degradation, and Head of the Sustainable Land Management Team. She has authored numerous technical publications, is an accomplished public speaker as well as a member of several scientific committees.

By driving around the globe in a solar-powered vehicle Solartaxi draws attention to the the world's reliance on fossil fuels, and points out that there are plenty of alternatives already available. Covering at least 50'000 km, 50 countries, 15 months and 5 continents, the Solartaxi team lead by LOUIS PALMER has embarked on a world circumnavigation, from West to East, starting and ending in Lucerne, Switzerland. The public can follow progress online, read travelogues, and even stage a welcoming event in their home town. For more information see www.solartaxi.com

The Banksia International Award of Australia acknowledges individuals or organisations who have made or are making a significant contribution for the betterment of our environment on a global level. Governor ARNOLD SCHWARZENEGGER, who governs the world's sixth largest economy (California), was the recipient of this year's award, presented on 20th July, 2007 at the Sydney Convention

Centre. The importance of Governor Schwarzenegger's environmental platform is not so much in its details as in the fact that a popular, high-profile Republican elected official is taking environmental problems seriously and putting forward thoughtful ideas for solving them. Some of which include: world's first low carbon standard for transportation fuels; creating the Hydrogen Highway; launching the Breathe Easier campaign; establishing the Sierra Nevada Conservancy; promoting the clean power of the sun; and promoting eco-friendly behaviour in the workplace.

www.banksiafdn.com

NUNATAK is the British Antarctic Survey's Rothera Research Station's house band. The five person indie rock band is part of a science team investigating climate change and evolutional biology on the

Antarctic Peninsula - a region where temperatures have risen by nearly 3°C during the last 50 years. Nunatak is a Greenlandic word and refers to an exposed summit of a ridge mountain or peak (not covered with snow) within an ice field or glacier. The band shot to global fame when it performed at this year's Live Earth concert on 7 July. Concerts from all 7 continents aimed to raise awareness of climate change world-wide.

www.antarctica.ac.uk

a new compact?

by Mohamed T. El-Ashry

Protecting the ozone layer has unquestionably been the most important achievement in the nascent history of global environmental policy. The ozone layer is recovering, the industrialized countries have eliminated chlorofluorocarbons (CFCs) and halons—the two major ozone-depleting substances—and many developing countries are well ahead of the Montreal Protocol timetable that gives them until 2010 to phase them out.

Many national and international actors have contributed to the Montreal Protocol's success, including the Global Environment Facility (GEF). Its contribution to the protection of the ozone layer is one of its most important achievements. As the source of financial assistance for phasing out ozone-depleting substances in Russia and 18 other countries with economies in transition, the GEF has enabled most of them to meet the same stringent timetable as is required of the industrialized nations. These projects have typically been carried out with strong local support and participation as the countries realized that it was in their interest to phase out the use of chemicals banned in industrialized ones. When, inevitably, technical problems arose, they were addressed in a spirit of cooperation, with an important role for technology transfer.

The GEF's role in financing ozone protection in these countries indicates its flexibility in going beyond its role as a financial mechanism for global environmental conventions. On the same basis, it has also supported climate change projects, carrying these out in a way consistent with, but outside, Convention mandates.

The GEF's history is in many ways closely interwoven with that of the protection of the ozone layer, even beyond its participation in funding ozone-protection projects. The international negotiations that led to the GEF pilot phase ran concurrent with those related to creating the Multilateral Fund, and common principles are reflected in both agreements. To take one example: both included the principle that funds should be provided for the added or 'incremental costs' incurred to protect the global environment, reflecting the understanding that developing countries' growth should not be penalized by expenses that could not be justified by domestic benefits. Using existing institutions, primarily the World Bank, UNDP and UNEP, to prepare and implement projects, was another shared principle The importance of scientific and technical advisers is an important feature in both systems, and, in both, donors negotiate the provision of resources on roughly a four-year cycle.

The GEF's evolution was also shaped in some ways by reactions to the Multilateral Fund. One difference is the governance structure: the Multilateral Fund works on the United Nations formula of one country, one vote, while the GEF has a double majority system that reflects the interests of both donors and recipients. Another distinction, which influenced GEF negotiations, was the desire to avoid a proliferation of single-purpose funds. We have learned that global environmental problems are often difficult to treat in isolation: for example, we were asked to help replace hydrofluorocarbons (HFCs)—chemicals introduced as replacements for ozone-depleting substances in refrigeration that unfortunately proved to contribute to climate change. The ability to look across global environmental issues – such as in the linkage between climate change and biodiversity and climate change and desertification - is proving to be one of the most valuable features of global environmental policy.

The Montreal Protocol's 20th Anniversary coincides with intense international debate on how to go about reducing greenhouse gases and stabilize climate change. As the world celebrates its success, its lessons should guide the international community's search for a new agreement on climate change beyond 2012, when the initial commitments of the Kyoto Protocol come to an end. In much the same way as happened during the negotiating of the Montreal Protocol, special interests are claiming that regulations to curb climate change would have adverse economic impacts, some are using scientific uncertainty as an excuse for delaying action, and many politicians are willing to live with the long-term damage from climate change rather than accept the short-term costs of avoiding it.

The convergence of science and diplomacy in developing ozone policy—and the social response that followed—represents an unprecedented compact between scientists, governments, industry, and civil society. The Montreal Protocol and the Vienna Convention also represent the first application of the 'precautionary principle', whereby action is taken without full scientific certainty so as to prevent an emerging problem becoming a crisis. The agreements also use the principle of 'common but differentiated responsibility'—recognising that developing countries (as with greenhouse gases) have contributed little to the problem and hence are entitled to special consideration even though all nations are responsible for protecting the ozone layer (and the global commons). Also, for the first time, financial assistance was provided to developing countries to help them with implementation of their commitments under the agreements through the Multilateral Fund—a precedent followed in both the climate change and biodiversity conventions.

Once again, governments (developed and developing), scientists, industry, and NGOs are called upon to come together in a new compact, this time to avert the serious threat of climate change. It is said that reaching agreement on the Montreal Protocol was helped by the political leadership exercised by the United States, which (as with greenhouse gases now) was the largest emitter of ozone-depleting chemicals. Will history repeat itself?

recovery delayed

an interview with Mario Molina

Mario Molina's name may not exactly be written in the stars, but the Mexican chemist and Nobel Prize winner is one of a select few to have a piece of the solar system called after him. An asteroid to be precise.

In this he keeps eclectic, if exalted, company. Writers Isabel Allende and Ray Bradbury have their names on their own chunks of rock, scattered between Mars and Jupiter. All the Monty Python comedy team are similarly in orbit around the sun - as are Engelbert Humperdinck (the German composer, not the pop singer), several knights of King Arthur's legendary round table, and Robbie Naish, the pioneering American windsurfer. There are, naturally, a lot of astronomers – but also a Japanese teddy bear artist.

Prof Molina also has two colleagues up there with him - Prof Paul Crutzen and Prof Sherwood Rowland , who jointly won the Nobel Prize for chemistry with him in 1995 for their work in identifying the threat to the Earth's vital ozone layer. And there's something appropriate about this. For the barren surfaces of the atmosphere-less asteroids, pitilessly exposed to the sun's ultraviolet rays, serve as a reminder of the importance of the protective layer to our planet.

Prof Molina was a 30 year old postdoctoral fellow at the University of California in Berkeley in 1973, when Sherwood Rowland - then his professor -offered him a range of options for research. The one that most intrigued him was finding out the environmental fate of the inert man-made chlorofluorocarbons (CFCs) then accumulating in the atmosphere from being used in aerosol cans, refrigeration, plastic foams and a host of other applications. At first, he says, "the research did not seem to be very interesting, nothing in the lower atmosphere appeared to affect the chemicals."

But he knew that they would eventually drift high enough to be broken down by solar radiation. And when he looked at what would then happen, he realised that each of their chlorine atoms would destroy thousands of atoms of ozone. He and Prof Rowland worked out that if CFCs continued to be released at their current rate they would, within 30 years, destroy 20 to 40 per cent of the ozone shield.

Molina was so surprised when he first did the calculations that, he told Our Planet: "I thought I had made a mistake". That, he adds, was also the reaction of some scientists when they published their results. The experts in the field, he says, "accepted it quite readily" but "it took quite a while to make the case to the scientific community in general". And, he adds, "it took even more effort to bring it to the political arena".

After much debate, the danger was eventually recognised. The United States banned the use of CFCs in spray cans in 1978, and the world agreed the Vienna Convention for the Protection of the Ozone Layer in 1985. But it was not until after the discovery of the Antarctic ozone hole later that year that the international community agree to tackle CFCs globally in the 1987 Montreal Protocol, which progressively strengthened as the scientific evidence accumulated, and is phasing out CFCs and other ozone depleting substances (ODS) worldwide.

Prof Molina says the amount of ODS in the atmosphere peaked a few years ago and is "beginning to decrease slowly, which is very good news." He adds that some scientists believe they may be starting to see resulting beneficial effects on the ozone layer but he fears that, - just as things finally look as if they are improving - there may be a serious setback, due to climate change. "With a changed atmosphere through global warming, there is a likelihood that the ozone layer will take longer to recover", he says. As climate change warms the surface of the earth and the troposphere (the lower layer of the atmosphere), it cools the stratosphere further up, enhancing the process of ozone destruction. "The colder it is" he says," the more depletion you get". The recovery, due around 2050, could be delayed by ten to 15 years.

This, as he points out, is yet another reason to tackle global warming. And one important contribution would be to strengthen the ozone protection protocol agreed twenty years ago. By phasing out CFCs, which are also powerful greenhouse gases, the Montreal Protocol has already done more to combat climate change than the Kyoto Protocol will ever do. An authoritative study published last March - by scientists from the Netherlands Environmental Assessment Agency, the US Environmental Protection Agency and National Oceanic and Atmospheric Administration and DuPont - concluded that phasing out CFCs and other ODS will save the atmosphere the equivalent of eleven gigatonnes of carbon dioxide a year by 2010. By contrast, the Kyoto Protocol will spare it the equivalent of just two gigatonnes over what emissions would then have been if the growth of greenhouse gases had continued unabated.

Like many experts, Prof Molina wants the Montreal Protocol to go further and accelerate phasing out HCFCs and HFCs - used as transitional substitutes for the CFCs - and thus increase its effectiveness in both combating climate change and protecting the ozone layer. "The trend now is to try to speed up the transition. Some of the HCFCs are much better than others, so the hope is that at the twentieth anniversary the protocol can be fined tuned to speed up the deadline for some of them."

He adds: "Although the Montreal Protocol is still a success story we need to keep watching it very closely, and keeping working at it, because of the potential for going into reverse if countries do not comply or there is illegal production of ODS. It is very important to continue to press to ensure the Protocol's continued success. There have been suggestions that the problem is already solved, but that is not the case." Nevertheless, he says, the Protocol has set important precedents for the international effort to combat climate change, not least "to show that it can be done". But time is very short , and he hopes that tougher action on greenhouse gases will not have to wait for an unpleasant surprise like the hole over Antarctica.

"The risk is that we might reach some tipping point where the changes are no longer linear -as with the ozone hole. We are already seeing visible effects of global warming - nasty situations like hurricanes, flooding and drought. That should be enough of a warning for us: we already have enough information about climate change. It would be extremely risky to wait until something more dramatic happened. But the risk of much worse surprises will clearly increase quite severely should society continue for another decade without taking clear action.

"The perception among experts is that we have about a decade to begin some very serious changes in the way we do things and, because of the time it takes for measures to be implemented, that means we have to start planning a truly international climate agreement that would mimic the Montreal Protocol."

meeting

In 1998, the Government established a specific cell in the country programme. It was specifically tasked with overseeing the phase-out of ODS, advising industry its choice of technologies, facilitating the flow of funds for the switchover and creating general awareness about the process. By 2003, India had received an estimated US$ 137 million from the Multilateral Fund for over 349 ODS phase-out projects

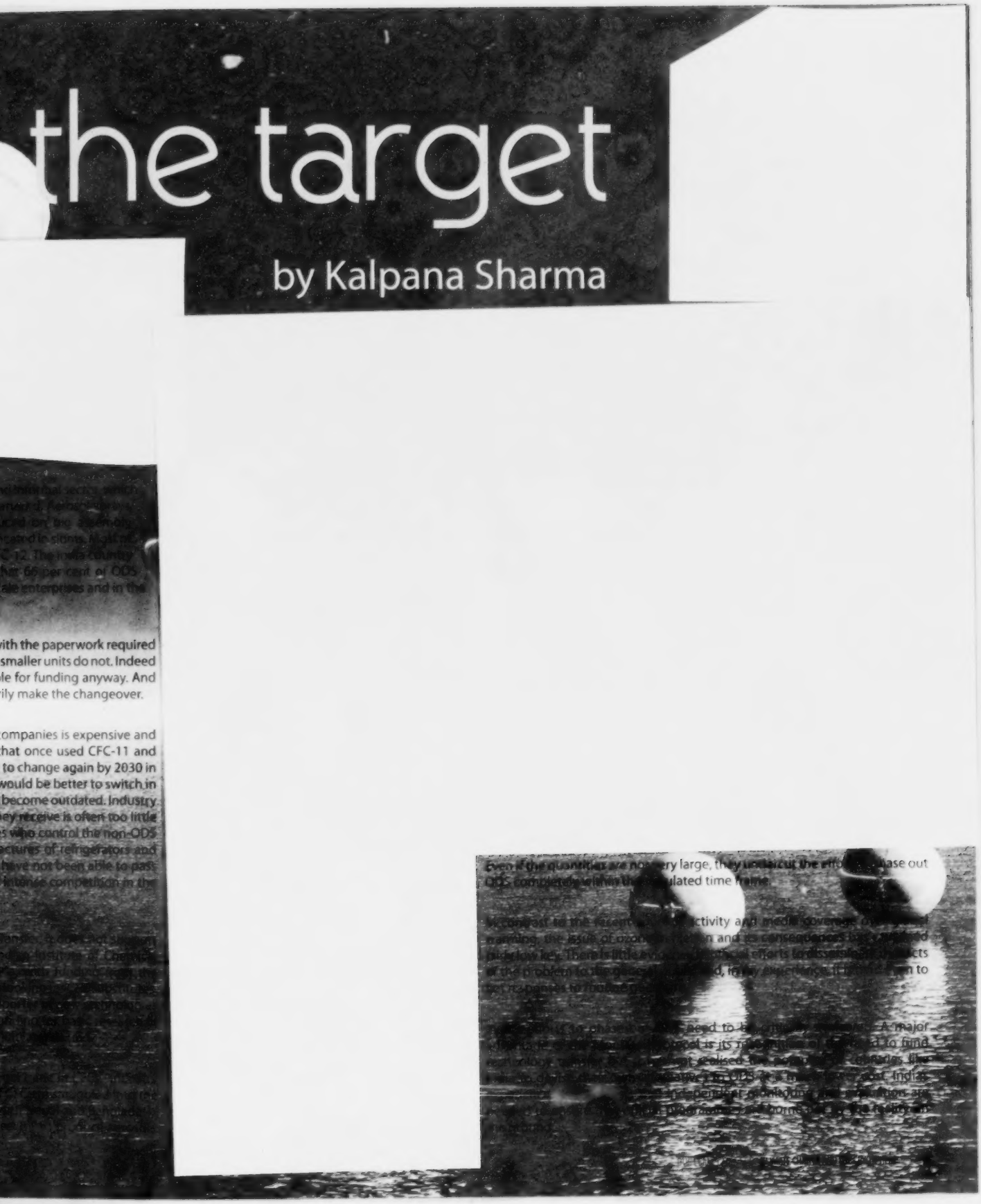
The Government provided technical assistance and funds, and brought in the ODS (Regulation and Control) Rules 2000 under the 1986 Environment Protection Act, specifying the time frame for the phase out. In 1995, as part of a package of incentives, it granted full exemption from customs and excise duties to capital goods imported for ODS phase-out projects funded by the Multilateral Fund, and the next year, extended this concession to new projects based on non-ODS technologies.

While bigger enterprises have the ability to c to apply for funding to switch to substitutes, many of them fall below the minimum size without financial help, none of them will vo

Second, the technology being offered to In will soon become redundant. Indian indust CFC-12, but have switched to HCF-134a, will order to move away from this greenhouse g the first place to a technology that will not q representatives also complain that the fund and too late and that the multinational com technologies change too much for them. M

the target

by Kalpana Sharma



crucial crossroa

The Montreal Protocol is the world's most successful environmental agreement – and not just for what it has done for the ozone layer. By 2005, its parties cut the production and consumption of all ozone-depleting substances by 95 per cent, placing the layer on a path to recovery later this century. And its phase-out of chlorofluorocarbons (CFCs) and other ozone depleting substances that are also potent greenhouse gases has also made it the world's most effective climate treaty—reducing greenhouse gas emissions by the equivalent of approximately 11 gigatons of carbon dioxide a year between 1990 and 2010, and thereby delaying the onset of climate change by up to 12 years.

One of the treaty's most important qualities—as delegates to a two-day dialogue by Parties on its future in Nairobi in May 2007 recognised—is its flexible and dynamic design, which has enabled it to respond to improvements in the scientific understanding of ozone layer depletion. Establishing assessment panels—operating on a voluntary basis with the participation of industry, governments and academia—has, as the Protocol's Executive Secretary pointed out, given Parties access to the best available information on which to make decisions. This has improved their ability to address threats to the ozone layer promptly, even pre-emptively, by adding new chemicals when their risks are scientifically identified, as well as putting controls on ones that had never before existed.

The Protocol's Multilateral Fund, as the delegates also appreciated, is a key factor in its success. All the treaty's control measures come with a legal obligation for industrialized countries to provide financial assistance to developing ones to ensure their successful implementation. The Fund was one of the first operating financial mechanisms designed to enable compliance with international environmental treaty obligations, and its successful management has facilitated the transfer of technologies to make this possible for developing country Parties. Its support has included establishing

140 ozone units in developing countries, helping to create regulations and legislation in over 100 developing country Parties, and setting up regional networks to support the sharing of information both on a South-South and a North-South basis. It has also undertaken an extensive effort to train key partners in the ozone protection regime, including hundreds of customs officials and thousands of refrigerant technicians in developing country Parties.

The Protocol's attention, from the outset, to compliance, through establishing a model non-compliance mechanism, has resulted in record levels of observance, with direct benefits for the ozone layer. The Secretariat reports that it has achieved and maintained a rate of reporting of compliance data of at least 99 per cent and an overall compliance rate of well over 90 per cent. It has also successfully assisted 25 Parties to return to compliance through cooperative engagement and the pointed allocation of resources. Dialogue participants acknowledged the importance of this and also pointed out that the Protocol's straightforward, command-and-control style of regulation, setting specific legally-enforceable production and consumption targets, proved that a "back to basics" approach to regulation can be the most cost-effective and expeditious way to achieve environmental protection, making the Protocol a model for international environmental governance.

And yet, as the thoughtful discussions in Nairobi made clear, the treaty is at a crucial crossroads: much has been accomplished, but much remains to be done. The public perception that the ozone layer problem has been "solved" is simply not true. Indeed it is now at its most fragile state in recorded history, leaving people and ecosystems exposed to unprecedented levels of harmful ultraviolet radiation.

The Antarctic ozone hole has reappeared each austral spring since its initial discovery, and each year it has generally grown larger and lasted longer. Though significant progress has been made in reducing atmospheric concentrations of chemicals that destroy the ozone layer, recovery is still decades away. The most recent prediction by experts delays the recovery of the ozone layer until 2049 in mid latitude areas, and until 2065 in polar regions—much later than previous estimates. This also assumes full compliance, and does not take into account illegal trade—otherwise recovery will be delayed further. The

ds by Danielle Fest Grabiel

nternational community must maintain its commitment to finishing the job of protecting the ozone layer.

We must also be prepared to deal with additional challenges and opportunities, especially the significant contribution that ozone-depleting substances (ODS), and some of their substitutes, are making to climate change. In the early 1990s, hydrofluorochlorocarbons (HCFCs) became the first generation of substitute chemicals for CFCs, and were added to the list of substances controlled by the Protocol. It was recognized that they were not the solution to ozone layer destruction, but had value as "transitional substances" to help the prompt phase-out of CFCs. But exponential growth in the demand for refrigerant gases worldwide has resulted in unchecked and excessive production of HCFCs. As many contribute significantly to global warming (HCFC-22 , notably, is 1,700 times more effective than carbon dioxide), the Protocol has inadvertently encouraged the creation of a significant source of greenhouse gases. Developing countries are set to produce millions of metric tons of HCFCs over the next ten to twenty years, and their currently agreed phase-out under the Protocol is still decades away. So their unhindered growth will severely undermine the international community's efforts to address climate change.

Recognizing this threat, several Parties have put forward proposals to accelerate the elimination of HCFCs under the Protocol. Many come from developing nations which are most vulnerable to the impacts of a changing climate, including ones from small island nations, like Mauritius, Palau and the Federated States of Micronesia and from Argentina and Brazil. By acting on them, the international community can use the Protocol to make a significant contribution to the global effort to mitigate climate change. Recent estimates suggest that an accelerated phase-out could avoid the emission of the equivalent of 5 and 22 billion metric tons of carbon-dioxide. This compares favourably to the 1 billion metric tons of carbon dioxide equivalence per year in emissions reductions mandated by the Kyoto Protocol by 2012. And these estimates do not include the additional reduction in emissions that would result from unwanted byproduct emissions and improvements in energy efficiency as a result of the phase-out.

The management of 'banked' ozone depleting substances – those at present contained in products and equipment—also argues for the maintenance of the Protocol and its institutions. When equipment reaches the end of its useful life, the chemicals inside are usually released into the atmosphere. With limited incentives for their recovery and destruction , most of the ODS banked in this way will be emitted into the atmosphere over the next decade, damaging both the ozone layer and the climate. Emissions from CFC banks alone could amount to the equivalent of as much as 7 billion metric tons of carbon-dioxide by 2015—more than seven times the size of the emissions reductions initially targeted by the Kyoto Protocol.

The illegal trade in ODS now amounts to about 10–20 percent of the total trade: 7,000–14,000 tons of CFCs alone are illegally traded each year, with a value of US$25–60 million. The problem could become even worse without sustained enforcement efforts and attention by the Parties, especially as control measures tighten.

When the Montreal Protocol was agreed twenty years ago, many believed it would be impossible to achieve the scale of reductions proposed. Others were concerned that the cost and administrative burden would be too great. Yet, thanks to thoughtful design, able practitioners and well-resourced institutions, it has performed beyond expectation, making it our most cost-effective tool for atmospheric protection.

It clearly offers a vital and unique resource for approaching problems associated with the atmosphere. Many of the non carbon-dioxide gases regulated by the Kyoto Protocol are used in applications similar to ODS—in some cases, identical to them. It stands to reason that Montreal Protocol-style regulation could meet with similar success for these gases. Besides, the complex interactions between the climate and ozone systems will almost certainly present new challenges that will require the maintenance of the expertise housed within the Montreal Protocol's technical bodies and institutions.

The remaining challenges in addressing ODS—and climate change, the greatest environmental challenge of our time—should ensure that the Montreal Protocol, its institutions and expertise, remain available and actively engaged in atmospheric protection. This will require a commitment now to revitalise and renew it.

greenfreeze

by Jamie Choi

Twenty years after it was signed, the Montreal Protocol is still hailed as a beacon of how governments, industry, scientists, and activists can find common ground to avert an environmental crisis. Non-governmental organizations (NGOs) campaigned and collaborated with implementing agencies—both during formal sessions and informal corridor negotiations—to convince governments to prioritize the environment.

Greenpeace was a leading participant, advocating the earliest possible phase-out of all ozone depleting substances (ODS). But its biggest contribution to the Protocol came after its ratification, as the world waited to see which refrigerants and blowing agents would replace chlorofluorocarbons (CFCs) and halons. It opposed the chemical industry's proposal to substitute such second generation ozone-depleting and global warming substances as hydrofluorochlorocarbons (HCFCs) or global warming substances such as hydrofluorocarbons (HFCs), being convinced there was a way to avoid them by using cleaner and innovative technology.

Its pursuit of innovation led to the creation of Greenfreeze, which uses environmentally-friendly substances such as hydrocarbons as refrigerants and blowing agents. It found a partner in an East German manufacturer, Foron, which began building the first Greenfreeze prototypes in 1992, and worked behind the scenes to acquire government, scientific, and consumer endorsement for the technology. Greenfreeze was one of the first-ever NGO attempts actively to participate in technology innovation to transform an industry.

To a large extent, this has paid off. The world now has over 200 million Greenfreeze refrigerators: 27 million more are now produced each year, one third of the world's total production. Almost every domestic refrigerator now sold in Germany uses the technology. Since the first Greenfreeze refrigerators rolled out of Foron's factories, over 250 variations of the technology have been developed and most large manufacturers—including Bosch-Siemens, Electrolux, Whirlpool, Samsung, LG, Haier, and Liebherr—now use it.

But perhaps the biggest achievement was spreading Greenfreeze in China, the world's fastest growing market and its largest producer of ozone-depleting substances. Greenpeace faced enormous obstacles:technology transfer gaps, shortage of capital, and low public environmental awareness. It also lacked local campaigning experience—it did not yet have a China office—which posed cultural, language, and political challenges. But there was also a real opportunity. As a signatory to the Montreal Protocol, China was obliged to phase out CFCs by 2010 and this caused concern to manufacturers. Switching directly from CFCs to Greenfreeze made more long-term financial sense than investing in HCFCs (which had to be phased out in developing countries by 2040) and HFCs (which, while having no such deadline, still faced the danger of eventual phase-out) only to have to switch to Greenfreeze in the future. And—unlike HCFCs and HFCs, which required expensive processing and licensing—Greenfreeze technology could be purified cheaply from stocks of raw gases already widely available in China.

Greenpeace believed it was vital to align the diffusion of Greenfreeze with China's sustainable development goals, allowing a transitional economy to skip using dirty and unsustainable technologies and to move directly into cleaner innovations. Impressed by a Greenfreeze exhibition at an international conference on CFC alternatives in Beijing in 1993, Chinese officials asked Greenpeace to facilitate technology transfers and help catalyze joint ventures between Chinese and German manufacturers.

With the Chinese government's support, Greenpeace began to exert worldwide public pressure on the World Bank to grant developing countries access to the Protocol's Multilateral Fund to finance conversion to Greenfreeze. In 1993, the World Bank's Ozone Operations Resource Group endorsed the technology as a valid replacement for CFCs in household refrigerators, paving the way for its dissemination in developing countries. In 1995, Haier (the Chinese refrigerator giant) teamed up with Liebherr (Germany's market leader) to produce the first Greenfreeze refrigerators in China. Soon Foron, Electrolux, and Bosch-Siemens had established technical cooperation or formed joint ventures with other Chinese companies. By mid-1995 three out of the four largest refrigerator manufacturing sites in China had partially converted to the technology.

By 2000, 35 per cent of all domestic refrigerators sold in China were Greenfreeze, and the technology's market share has steadily risen since, helping the country to achieve a substantial reduction of ODS and fulfill its targets. There is also wide activity within China to spread it beyond the domestic refrigeration market. Chinese universities and companies, for example, have invested large amounts of resources in recent years to explore new natural working fluids in refrigerants, such as CO_2, ammonia, water, and air. Some of the biggest multinational companies operating in China, like Unilever and Coca Cola, have already begun rolling out HFC-free commercial refrigerators or are exploring ways to do so.

The Chinese government has announced its decision to eliminate CFCs and halons by 1 July 2007, two years ahead of the deadline set for developing countries. It is expected that the 11th Five-Year plan of the Chinese National People's Congress—which for the first time sets energy conservation and environmental protection as main priorities - will help spread such natural working fluids in China. Greenfreeze has the added benefit of being more energy efficient than HCFCs and HFCs.

All this demonstrates how a combination of technical innovation and activism can work together to green markets. Yet the Greenfreeze campaign is far from over. Perhaps because so much has already been achieved, there is a growing sense of complacency among industry innovators, governments, and activists alike over the need to push for a a wider distribution of the technology to combat ozone depletion and global warming. HCFCs and HFCs continue to be used in refrigerators, particularly commercial ones, throughout the world. The chemical industry has used its influence in the United States and Canada—and continues to do so—to obstruct the introduction of Greenfreeze technology, effectively limiting competition. Developing and commercializing Greenfreeze air conditioners has been extremely slow worldwide. And questions over the recovery and safe destruction of banked CFCs, and other potent ozone depleting and global warming refrigeration substances similarly contained in existing products, have yet to be addressed. Tackling these issues in developing countries like China, where a great number of first generation CFC refrigerators are being replaced by new ones, is crucial.

Recent studies by the German scientific institute Oko-Recherche suggest that all fluorinated gases (F-gases) combined will contribute 5.2 per cent of global warming over the next 20 years, rising to 8.6 per cent in 2050. As the window of opportunity to prevent dangerous climate change gets smaller every year, curbing CFCs, HCFCs, and HFCs will be crucial in fighting global warming, not to mention ozone destruction. If fluorinated substances are not totally phased out it will be extremely difficult to achieve the target of limiting global warming to a maximum of two degrees. We must use the 20th anniversary of the Montreal Protocol to revitalize the sense of urgency around the global phase-out of F-gases and the further diffusion of such natural refrigerant technologies as Greenfreeze. This is the only appropriate way truly to preserve the legacy of the Montreal Protocol.

awards and events

equator prize

Five community groups from the tropical regions of Africa, Asia and Latin America won the UN-backed **Equator Prize** for initiatives to alleviate poverty while conserving biodiversity. The winners, who will each receive $30,000, were selected from 25 finalists chosen from more than 300 original nominations. The village of Andavadoaka in Madagascar was honoured for managing an octopus fishery to provide sustainable long-term benefits. In Kenya, the Shompole Community Trust was rewarded for conserving scenic savannah as part of a profit-making ecotourism venture for the local Masai people. In Guatemala, the women of Alimentos Nutri-Naturales won the prize for reinstating the Maya nut as a staple source of nutrition and thus conserving the nut forests in the buffer zone next to a biosphere reserve. The women of Isabela Island's "Blue Fish" Association, who work within the World Heritage-listed Galapagos Islands in Ecuador, were rewarded for marketing a local delicacy—tuna smoked with guava wood—to promote the alternative use of marine resources and control invasive plant species. The fifth winner, Shidulai Swarnivar Sangstha, uses riverboat-based educational resource centres throughout the Ganges River delta in Bangladesh to deliver information about sustainable agricultural practices and market prices.
http://www.undp.org/equatorinitiative/

Through its Awards Programme, the Banksia Environmental Foundation aims to raise the profile of current environmental issues facing Australia and recognise those whose initiatives are an encouragement and an example for others to follow. In 2007, the 53 finalists across 11 awards included large and small corporations, individuals and government departments. The Origin Gold **Banksia Award** went to Westpac (bank) for its outstanding achievement in the area of corporate sustainability. The Gold Banksia goes to the 'best of the best' selected from the winners of each Banksia Category Award. (See People for the Banksia International Environmental Award). http://www.banksiafdn.com/

Banksia awards 2007
Solutions through Convergence

The 2007 UNEP **Sasakawa Prize** has two winners: Jeunesse Park from South Africa, the CEO of Food and Trees for Africa (FTFA) and Abul Hasanat Mohammed Rezwan of the Bangladeshi NGO Shidhulai Swanirvar Sangstha (SSS). The joint winners have been awarded the prize for their work in the area of climate change, the theme of this year's prize. Among other activities, Jeunesse Park of FTFA won the award for the invention of a carbon calculator, the first South African calculator of its kind that provides a high level estimation of one's 'carbon footprint'. SSS won the award for a range of activities: devising bicycle pumps which reduce CO2 emissions, portable solar home systems; and for bringing environmental awareness through libraries and training centres to isolated communities in Bangladesh. The UNEP Sasakawa Prize is awarded annually and is worth a total of US$200,000. This year the prize is shared between the joint winners and the award ceremony will be held in October in New York.

THE PRIZE

Foundation For the Future has named geneticist Dr. Spencer Wells the 2007 winner of the **Kistler Prize**. The prize, worth US$100,000 is awarded annually for original work that significantly increases knowledge and understanding of the relationship between the human genome and society. Dr. Wells is being honoured for a body of work in the science of population genetics, culminating in the design and implementation of national Geographic and IBM's Genographic Project, a five-year effort now under way to map humanity's genetic journey to populate the planet. Dr. Wells is the Director of the Project. The prize, comprising the cash award and a 180 gram gold medallion, will be formally presented at a ceremony in Washington, USA on 20 September.
www.futurefoundation.org

A 70-hour music extravaganza, covering 120 territories, seven continents and going on for 24 hours attracted a 1 million live audience and more than 8 million online viewers for what was billed as the largest live-music event ever. Initiated by former US Vice President Al Gore, the concerts were set to trigger a global movement to combat the climate crisis. The proceeds from the **Live Earth** concerts will create the foundation for a new, multi-year global effort to combat the climate crisis led by the Alliance for Climate Protection chaired by Mr Gore.
http://www.liveearth.org/

LIVE EARTH
THE CONCERTS FOR A CLIMATE IN CRISIS

With the theme of "Progress and Prospects on Water: Striving for Sustainability in a Changing World" World Water Week kicks off in Stockholm in August. Organized annually by the Stockholm International Water Institute (SIWI), **World Water Week** is the leading annual global meeting place for capacity-building, partnership-building and follow-up on the implementation of international processes and programmes in water and development. Water is at the very centre of most climate-related effects, and climate issues take centre-stage this year.
www.worldwaterweek.org

WORLD WATER WEEK
in Stockholm

World Maritime Day 2007 - 27 September. This year the theme is 'IMO's response to current environmental challenges'. This gives the International Maritime Organization the opportunity to focus on its environmental work - past and present - and to intensify its efforts to help protect and preserve the environment before it is too late.

WWW

Ozone and the Environment: Useful Links

This page contains links to websites from governments, international organizations, non-governmental organizations, businesses, media and other groups from around the world to help you research ozone and the environment. We have compiled these links from our own review of the vast amount of information available on the internet to help you to find the most relevant sources for your research. Our Planet magazine does not, however, endorse the viewpoints of any of the groups to which we link, and we cannot guarantee the accuracy of the information posted on these sites. Rather, we hop to provide you with a broad range of opinions and perspectives.

know the facts

www.unep.org/themes/ozone/
UNEP's ozone website provides information on key UNEP activities related to restoring the ozone layer, as well as links to UNEP's partners.

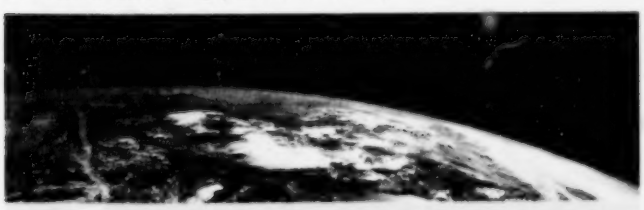
http://ozone.unep.org/
Website of the Ozone Secretariat: with information on the 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer.

http://www.gefweb.org/default.aspx
The Global Environment Facility (GEF), in partnership with the Montreal Protocol, funds projects that enable the Russian Federation and nations in eastern Europe and central Asia to phase out their use of ozone destroying chemicals.

www.uneptie.org/ozonaction/
UNEP's OzonAction Branch assists developing countries and countries with economies in transition so they can achieve and sustain compliance with the Montreal Protocol.

www.unep.org/tools/
UNEP's Resource Kit contains a wide range of resources on ozone including tools for national ozone officers, farmers, teachers, customs officers and small businesses.

www.ozzyozone.org/
UNEP's website for children encouraging ozone awareness and safety.



chinese language

http://zhidao.baidu.com/question/27460501.html?si=2
Do you know how the hole in the ozone was formed? For more information, visit this site.

www.jl2sy.cn/xssq/hbsn/green/gala/chouy.htm
International Ozone Layer Protection Day is celebrated each year in September. This website provides detailed information on this special day.

http://solvent.ozone.org.cn/shownews.asp?id=80
If you're looking for information on the ozone layer, this website is packed with information.

www.edu.cn/20010101/21144.shtml
How can we repair the hole in the ozone layer? Experts from Chinese Academy of Sciences can help you to answer this question.

www.china.org.cn/chinese/huanjing/588767.htm
Many activities take place in China for International Ozone Layer Protection Day. The Chinese government appeals to people to protect the environment as best as they can.

www.unep.org

UNEP in Chinese www.unep.org/Chinese - UNEP launched a newly designed Chinese-language homepage in July. The site provides an entry point to a broad range of information about UNEP and the environmental issues with which it is concerned. Key websites of particular interest to the Chinese-speaking community are being translated, including information on World Environment Day, About UNEP, Climate Change, Urban Issues, Sport & the Environment, and the Billion Tree Campaign.

UNEP Resource Kit www.unep.org/tools/ - UNEP Resource Kit is a central repository for UNEP's technical guidelines and resources for governments, policy-makers, civil society, private sector and the public at large. Information includes technical guidelines, CD ROMs, trainer manuals, databases, clearinghouses, publications and other useful tools.

UNEP Indigenous Knowledge Website www.unep.org/ik - This database houses information on indigenous practices in Africa related to natural disaster management and prediction based on research Kenya, Tanzania, Swaziland and South Africa around four themes: nature conservation, natural disaster management, poverty alleviation and traditional medical practices. The website aims to encourage use of the vast repertoire of indigenous knowledge into development projects and policies.

http://www.unep.fr/ozonaction/networks/index.htm
Networking information on phasing out ozone depleting substances and related issues through regional networks of National Ozone Units (NOUs).

www.atm.ch.cam.ac.uk/tour/
The Ozone Hole Tour, hosted by the Centre of Atmospheric Science, University of Cambridge, gives an overview of the ozone layer and the development of the ozone hole over the Antarctic.

www.multilateralfund.org/
This site provides information on the Multilateral Fund which assists developing country Parties to the Montreal Protocol to comply with its control measures.

www.unido.org/
UNIDO is one of four implementing agencies of the Montreal Protocol. It outlines the goals, strategy and the results of ODS phase-out.

www.eea.europa.eu/maps/ozone/welcome
This site gives enables one to see how much pollution has been caused in a particular place in Europe. It also describes what ozone is and how pollution affects one's health and what you can do to reduce pollution.

www.nasa.gov/vision/earth/environment/ozone_resource_page.html
NASA and National Oceanic and Atmospheric Administration (NOAA) scientists report on the condition of the ozone layer, including the damage that has been caused.

www.niehs.nih.gov/oc/factsheets/ozone/home.htm
"Here at ground level, too much ozone gas accumulates - but in the stratosphere, the ozone layer has holes like sunglasses with a badly cracked lens" asserts this Ozone Alert fact sheet.

www.ucsusa.org/global_warming/science/faq-about-ozone-depletion-and-the-ozone-hole.html
The Union of Concerned Scientists offer answers to frequently asked questions about ozone depletion and the ozone hole.

www.epa.gov/
This site gives information on the ozone layer, the health implications of the depletion of the ozone layer as well as valuable information on how to protect yourself from ultraviolet rays.

blogs

http://www.uneptie.org/Ozonaction/blog.htm
A blog written by Rajendra Shende, Head of the OzonAction Branch, in his personal capacity.

http://www.mongabay.com/news-index/ozone_layer1.html
Mongabay seeks to raise interest in and appreciation of wild lands and wildlife, while examining the impact of emerging trends in climate, technology, economics, and finance on conservation and development. The ozone layer blog is updated regularly.

http://artsbeat.blogs.nytimes.com/2007/07/07/live-earth-drugs-love-and-the-ozone-layer/
Live Earth: Drugs, Love and Now . . . the Ozone Layer? This blog is hosted on the New York Times website.

products

Clean Energy

The H-Racer and Hydrogen Station Set is a lot more than a toy car, its environmentally sustainable, renewable energy hydrogen fuel cell design provides consumers with a glimpse into the future of clean hydrogen power transportation. It is the working miniature version of what is being developed in real-size cars of the future. Named Time Magazine Best Invention 2006, the best selling H-Racer continues to win prestigious design and consumer awards. The H-Racer operates on 100% clean fuel produced by a miniature solar-powered hydrogen refueling station that converts water into hydrogen using energy captured from the sun. Hydrogen is non-toxic, renewable, clean to use, and the most abundant element in our universe. As no combustion occurs inside a fuel cell, the only exhaust resulting from such a car is pure water.

www.horizonfuelcell.com

Flying Low

Aer Arann the fastest growing regional airline, flying between the UK, Ireland and Northern France is upgrading its fleet with several new generation ATR 72-500 planes over the next five years. Aer Arann continues its allegiance to turboprops rather than to jet engines, as they operate at lower altitudes, do not affect the ozone layer and upper atmosphere, use less fuel and have a significantly smaller noise footprint. Fast facts: a turboprop such as an Aer Arann ATR-72-500 emits 20% less CO2 per passenger-km than newer jets; the ATR produces 3 times less Nox (Nitrous Oxides) per passenger than a car and 40% less than a train; and an ATR 72 uses as much fuel on a typical 370km sector as a Boeing 747 uses in 10 minutes taxiing.

www.aerarran.com

Toyota Prius hybrids

Google and Pacific Gas & Electric have unveiled their vision of a future in which cars and trucks are partly powered by the country's electric grids, and vice versa. The companies displayed six Toyota Prius and Ford Escape hybrid vehicles in July that are modified to run partly on electricity from the power grid, allowing the vehicles to go up to 75 miles on a gallon of gas, nearly double the number of miles of a regular hybrid. They also modified one vehicle to give electricity back to the power company. The highly unusual test takes the hybrid, which is now familiar on American roads, a step further by using extra batteries to hold energy made and distributed by a power company. The technology is eagerly awaited by energy experts and environmentalists, but is not yet ready to go commercial because the additional batteries are not yet durable enough. A plug-in hybrid can lower emissions of carbon dioxide and smog-causing gases. It can go three to four miles on a kilowatt-hour, experts say.

Google's Energy Initiatives: www.google.com

Cut carbon

An exciting new piece of technology from universal remote control experts, One For All, means you can now switch off your audio visual devices via your remote without putting them into carbon-emitting standby mode. Operated together, the One For All Light Control system and Kameleon Generation III can also control the TV, stereo, DVD, set-top boxes and even your lights. Vice President of Product Development and Planning at One For All, Jacques Mathijsen, says 'The average UK household has up to 12 gadgets on standby or charging at any time, using around 2 power stations worth of electricity and 800,000 tonnes of carbon each year[1]. "Despite increasing awareness of our own personal carbon footprint, many of us find the standby habit a hard one to break. This simple device will allow you to switch off all your devices at the wall at the press of a button on your remote – stopping any energy being wasted.'

www.oneforallkameleon.com

Relax

Relax, the world's first solar powered, emission free, geothermal swimming pool complex, opened in June at the world beating eco-friendly water park, hotel and leisure complex at AquaCity Resort, Poprad in northern Slovakia. AquaCity's new luxurious pool centre is housed in a 12m high, architect designed steel, glass and wood structure, powered by electricity generated by photo-cells in the facade, with heating, pool water and showers supplied by geothermal water, in keeping with the entire AquaCity resort, to be ecologically and environmentally friendly. AquaCity resort saves up to 30,000 kg of carbon emissions per day, compared with a similar sized Alpine resort, being virtually self-powered, generating 80% of its electricity requirement and supplying its numerous pools and water park with geothermal water, drilled from a vast subterranean lake. In 2006, AquaCity saved 2.5 million euros on conventional energy costs.

www.aquacityresort.com

Floating Farm

The Science Barge is a sustainable urban farm. Growing food in the city can reduce pollution from conventional agriculture and transportation, and at the same time increase the spread of sustainable technologies like solar and wind power. At the heart of the Science Barge is a recirculating hydroponic greenhouse. Plants are irrigated with rainwater and desalinated river water. The Science Barge is carbon neutral and emits no waste stream. Vegetables are grown using 7 times less land and 4 times less water than conventional agriculture. Docked at the Hudson River Park's Pier 84, the purpose of the Science Barge is to encourage New Yorkers to think about sustainability in a new way. It demonstrates that it is possible to grow food locally with no net carbon emissions. Cities like New York could make use of unexploited roof top space to grow vegetables in the manner demonstrated on the Science Barge. In New York alone, approximately 5,000 hectares of unshaded rooftop space exists.

http://nysunworks.org/

Rooftop Gardens

Not enough green space in your town? How about a rooftop garden? Zinco of Germany has long been a world leader in roof landscape technology, now with its Zupermix growth media — comprising recycled clay bricks or tiles, with a blend of v.'canic materials — there is a perfect planting surface which provides nutrients, sufficient aeration and water retention for a rooftop landscape in which to plant a garden of your choice. Apart from the attractive appearance of a green roof there are also economical and ecological benefits. Green roofs are worth it - from small surfaces on garages or car ports up to large industrial surfaces. Quite apart from the aesthetic value, a building's waterproofing life expectancy is increased, because it is better protected from UV-rays, hail and extreme temperature differences. Thermal insulation benefits can save on fuel bills and green roofs filter and bind dust and other harmful materials out of a city's air as well as improve the microclimate by cooling and humidifying the surrounding air.

www.zinco.com Email: admin@zinco.com.sg

Amid the swirling traffic of London's Marble Arch stands a witness to the beginning of the entertainment industry's campaign to save the atmosphere. It's a cherry tree - and, appropriately enough, it was planted by the singer, Neneh Cherry.

Now international stars are falling over themselves to join the battle against global warming. Some, like Leonardo di Caprio and Cameron Diaz, are among the world's foremost environmental campaigners, but many are now taking steps to shrink their own carbon footprints and pressing for change, as this summer's worldwide Live Earth concerts testified.

But then, as Cherry told Our Planet, it was "very, very early days". The tree was planted to mark the founding of the pioneering carbon offset campaign, Future Forests. And her involvement had begun when she met its founder, Dan Morrell, around a camp fire in a "very, very muddy field" at the open air Glastonbury music festival.

She says: "I was really turned on by the fantastic concept of planting the amount of trees needed to consume your waste. It was very straightforward, very simple and very pragmatic - something people could really get their heads around."

She introduced Morrell to other stars, including Neil Tennant of the Pet Shop Boys, and there was "a domino effect" of others wanting to get involved. Both she and the Pet Shop Boys started offsetting their tours and within three years had produced 1.5 million carbon neutral CDs between them. Other groups - including The Levellers, Pulp, Pink Floyd and Atomic Kitten - were quick to join in.

Neneh Marianne Karlsson Cherry was born 43 years ago in Stockholm to Amahdu Jah, a Sierra Leonian percussionist and a noted Swedish painter and textile artist, Monika Karlsson. Her mother married the renowned jazz trumpet player, Don Cherry and she was brought up in New York and the small Swedish town of Hassleholm. She traces her interest in the environment to those early days. "The countryside of Sweden has been where I feel I belong. I have seen the trees around me grow. The ones that were smaller than me are now bigger than me and the ones that were bigger than me now tower over me. And quite a lot of them have been cut down, and that has almost broken my heart at times."

She dropped out of school at 14 and went to London to start her music career. Her family is steeped in the business. Her half-brother, Eagle-Eye Cherry, is also a well-known musician; her sister, Titiyo Jah, is a successful Swedish singer; and she is married to producer, Cameron McVey.

She is a strong supporter of the United Nations and has also taken up the causes of AIDS - helping to produce an early album to raise awareness and the fight against malaria, joining singer and UNICEF Goodwill Ambassador, Youssou N'Dour in the 'United against Malaria' concert in Geneva two years ago.

She says, "If I can draw attention to an issue as an artist, I feel it is my responsibility as a human being to do what I can." And she believes that the tide is starting to turn. "In the past not enough people have been alarmed enough at what is happening to the environment. But it seems that now the world is beginning to wake up."

Neneh Cherry

www.unep.org/ourplanet